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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte DAMIEN BOUVIER
and JOERG LINKE

Appeal 2015-006684
Application 13/639,434
Technology Center 3700

Before JENNIFER D. BAHR, JAMES P. CALVE, and SEAN P. O'HANLON, *Administrative Patent Judges*.

CALVE, *Administrative Patent Judge*.

DECISION ON APPEAL

STATEMENT OF THE CASE

Appellants appeal under 35 U.S.C. § 134 from the final rejection of claims 14–16 and 18–27. Appeal Br. 1. We have jurisdiction under 35 U.S.C. § 6(b).

We AFFIRM.

CLAIMED SUBJECT MATTER

Claims 14, 23, 24, and 27 are independent. Claim 14 is reproduced below.

> 14. A method for operating an internal combustion engine in a catalytic converter heating operation, the internal combustion engine being able to be operated in a normal operation, the method comprising:
>
> ascertaining a first exhaust gas temperature reading which gives an exhaust gas temperature of exhaust gas in a first catalytic converter; and
>
> operating the internal combustion engine in a first operating mode, in which, in contrast to normal operation, exhaust gas, having an increased exhaust gas temperature, is exhausted from at least one cylinder of the internal combustion engine, as long as the first exhaust gas temperature reading has not reached a specified first temperature threshold value;
>
> wherein, in the first operating mode, the internal combustion engine is operated so that no uncombusted fuel gets into an exhaust gas removal section.

REJECTIONS[1]

Claims 14–16, 18–21, and 23–27 are rejected under 35 U.S.C. § 103(a) as unpatentable over Gonze (US 7,818,960 B2, iss. Oct. 26, 2010) and Kraemer (US 5,479,775, iss. Jan. 2, 1996).[2]

Claim 22 is rejected under 35 U.S.C. § 103(a) as unpatentable over Gonze, Kraemer, and Stroh (US 7,926,263 B2, iss. Apr. 19, 2011).

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[1] The Examiner withdrew the following rejections: (1) claims 18–22 under 35 U.S.C. § 112, first paragraph; (2) claims 18–22 under 35 U.S.C. § 112, second paragraph; and (3) claims 14, 15, 17, 23, 24, and 27 under 35 U.S.C. § 102(b) as anticipated by Ruth (US 2008/0104945 A1, pub. May 8, 2008). *See* Ans. 3.

[2] We treat the listing of claim 17 with this rejection as a typographical error, because it was cancelled and no findings are provided. Final Act. 8–10.

ANALYSIS

Claims 14–16, 18–21, and 23–27 as unpatentable over Gonze and Kraemer

The sole issue for our consideration is whether Kraemer discloses a first operating mode in which "the internal combustion engine is operated so that no uncombusted fuel gets into an exhaust gas removal section." Each of independent claims 14, 23, 24, and 27 recites this feature. The Examiner relies on Kraemer to teach this feature based on the disclosure of an early supplementary injection that takes place after ignition top dead center when combustion from the primary injection is at least largely complete so that:

> The combustion chamber temperatures must be high enough that the amount of fuel to be supplementarily injected burns as completely as possible. This additionally introduced amount of fuel serves exclusively for the desired increasing of the exhaust temperature before the catalytic converter.

Kraemer, 2:1–6; Final Act. 8–9 (citing Kraemer, 1:50–2:6); Ans. 3. The Examiner explains that "[t]hose skilled in the art would have known that the prior art in mode one provides no uncombusted fuel entering the exhaust as it is both stated that the fuel is burned as completely as possible and serves 'exclusively for the desired increasing of the exhaust temperature' (Col 2, Line 1–6)." Ans. 4.

Appellants argue that there is no disclosure or suggestion in Gonze or Kraemer of the absence of uncombusted fuel in the exhaust gas removal section. Appeal Br. 5. Appellants also argue that the disclosure in Kraemer that the supplementarily-injected fuel "burns as completely as possible" does not mean that supplemented fuel completely burns or that no uncombusted fuel remains in the chamber after the main combustion. Reply Br. 2.

The Examiner's determination that it would have been obvious to modify Gonze to include a first operating mode that increases exhaust gas temperature from at least one cylinder to heat a catalyst to an activation temperature without uncombusted fuel getting into an exhaust gas removal section, as recited in independent claims 1, 23, 24, and 27, is supported by a preponderance of evidence and a rational underpinning. *See* Final Act. 8–9.

Kraemer teaches an early supplemental injection mode of operation in which fuel is injected after top dead center and burns "as completely as possible" so the "fuel serves *exclusively* for the desired increasing of the exhaust temperature before the catalytic converter." Kramer, 1:62–2:6 (emphasis added). Kraemer also teaches a late supplemental injection mode of operation in which fuel is injected even later after top dead center so the fuel does not burn, but instead evaporates, cracks, and mixes with the air and combustion gases and flows to an exhaust treatment device. *Id.* at 2:7–17.

Kramer explains that early and late supplemental injections may be combined. "[T]he point in time of the supplementary injection is chosen such that only part of the supplementarily[-]injected fuel is burned, and the exhaust temperature increases and the residual fuel remains unburned and . . . is available as a prepared reduction agent in the catalytic converter." *Id.* at 4:17–24. This disclosure teaches and conveys to skilled artisans that early and late supplemental injections are distinguished by whether all or only a part of the supplemental injection of fuel is burned. An early supplemental injection is chosen at a point in time where all of the fuel is burned. A late supplemental injection is chosen at a point in time where supplemental fuel is not combusted. A combined early and late supplemental injection occurs at a point where only part of the supplemental fuel is combusted.

Kraemer's teaching that an early supplemental injection introduces an amount of fuel that "serves exclusively for the desired increasing of the exhaust temperature before the catalytic converter" provides evidence and a rational underpinning to support the Examiner's determination that it would have been obvious to combust the fuel completely to heat the exhaust to a desired temperature in an early supplemental injection mode. Ans. 3 (citing Kraemer, 2:3–5). A preponderance of evidence supports the Examiner's finding that Kraemer teaches that early supplemental injection combusts all of the fuel so no uncombusted fuel gets into an exhaust removal section or the catalytic converter. It would have been obvious to choose an injection point for complete combustion of fuel and maximum heating of exhaust gas.

Kraemer's disclosure of a combined early and late supplemental injection method in which the injection point in time is chosen so that only part of the supplemental fuel injection fuel is burned to increase the exhaust temperature while other residual fuel remains unburned (Kraemer, 4:17–24) teaches that early supplemental injection, by itself, combusts all of the supplemental fuel to heat the exhaust gas, but late supplemental injection does not combust the fuel completely so some unburned fuel reaches the catalytic converter. It also teaches that it is known to select an injection point to achieve total or partial burning of supplemental fuel, as desired.

Moreover, even if Kraemer's disclosure at column 2, lines 1–6 could be understood to teach that an early supplemental injection may or may not completely combust all of the fuel, such teaching merely provides a range of combustion from complete to less than complete. This range overlaps the claimed complete combustion at an end point to create a prima facie case of obviousness. *See In re Peterson*, 315 F.3d 1325, 1329 (Fed. Cir. 2003).

Appellants do not present evidence of unexpected results to rebut the Examiner's obviousness determination. *See* Appeal Br. 4–5; Reply Br. 1–2. Instead, Appellants appear to claim this feature to generate the very expected result that all of the fuel is combusted to maximize the amount of heat that is generated in the exhaust gas and thereby provided to the catalytic converter. *See* Substitute Spec. 11:25–12:4. Like Kraemer, Appellants also disclose an afterinjection in which the fuel is injected so late that it does not burn in the cylinder, but passes uncombusted to oxidize in catalytic converter 9. *Id.* at 12:6–10. We do not interpret the claims to encompass this afterinjection embodiment.

Appellants' arguments do not persuade us of error in the Examiner's findings that Kraemer teaches and/or suggests early supplemental injection of fuel to heat exhaust gas and a downstream catalytic converter by burning the fuel completely to maximize heating. Nor do Appellants persuade us of error in the Examiner's determination that it would have been obvious to modify Gonze with this teaching to eliminate the need for a heating device.

We sustain the rejection of independent claims 14, 23, 24, and 27. As Appellants do not present separate arguments for any dependent claims, we also sustain the rejection of claims 15, 16, 18–21, 25, and 26. *See* 37 C.F.R. § 41.37(c)(1)(iv).

Claim 22 as unpatentable
over Gonze, Kraemer, and Stroh

Appellants argue that claim 22 is patentable for the same reasons as claim 20 from which claim 22 depends. Appeal Br. 6. Because we sustain the rejection of claims 14 and 20, this argument is not persuasive, and we also sustain the rejection of claim 22.

DECISION

We affirm the rejection of claims 14–16 and 18–27.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a)(1)(iv).

AFFIRMED